LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listing, of claims in the application.

1. (Previously Presented) An apparatus for use in a marine seismic survey, comprising:
a short baseline acoustic system or an ultra short baseline acoustic system, including:
a seismic survey object; and
an inertial measurement unit coupled to the seismic survey object at a known point and from which the movement of the seismic survey object can measured during a seismic survey such that the position of the known point during the marine seismic survey can be determined.

2. (Original) The apparatus of claim 1, wherein the seismic survey object comprises one of a seismic cable, a seismic receiver, a steering device, and a seismic source.

3. (Previously Presented) The apparatus of claim 2, wherein the seismic survey object is the seismic cable and the seismic cable comprises one of a streamer and an ocean bottom cable.

4. (Previously Presented) The apparatus of claim 2, wherein the seismic survey object is the seismic cable and the seismic cable includes one of a sensor module, a steering device, and an inertial positioning device in which the inertial measurement unit is housed.

5. (Previously Presented) The apparatus of claim 2, wherein the seismic survey object is the seismic cable and the seismic cable includes a plurality of acoustic receivers.

6. (Previously Presented) The apparatus of claim 2, wherein the seismic survey object is the steering device and the steering device comprises one of a Q-fin and a bird.

7. (Previously Presented) The apparatus of claim 2, wherein the seismic survey object is the seismic source and the seismic source comprises at least one of an air gun and a vibrator.

8. (Original) The apparatus of claim 1, further comprising an inertial positioning device in which the inertial measurement unit is housed.

9. (Original) The apparatus of claim 1, wherein the inertial positioning device further comprises:

a power system for the inertial measurement unit;

a communication interface; and

a battery powering the power system and the communication interface.

10. (Original) The apparatus of claim 1, wherein the inertial measurement unit comprises a plurality of accelerometers and gyroscopes.

11. (Original) The apparatus of claim 1, wherein the inertial measurement unit comprises a micro-electromechanical inertial measurement unit.

12. (Original) The apparatus of claim 8, wherein the inertial positioning device further comprises an acoustic node determined by either an acoustic source or receiver.

13. (Original) The apparatus of claim 12, wherein the acoustically determined point comprises one of an ultra-short baseline acoustic system, a short baseline acoustic system, or a distance measurement acoustic system.

14. (Previously Presented) A marine seismic spread, comprising:

a short baseline acoustic system or an ultra short baseline acoustic system, including:

a plurality of seismic survey objects, including a plurality of acoustic receivers and at least one acoustic source, distributed over a survey area from at least one known point; and

a plurality of inertial positioning devices coupled to the seismic survey objects at known points and capable of taking inertial measurements of the movement of the seismic survey objects relative to the known point such that the position of the known points during the marine seismic survey can be determined.

15. (Original) The marine seismic spread of claim 14, wherein the plurality of seismic survey objects include a plurality of seismic cables comprised of the acoustic sources and the inertial positioning devices.

16. (Original) The marine seismic spread of claim 15, wherein the seismic cables comprise one of a plurality of streamers and a plurality of ocean bottom cables.

17. (Previously Presented) The marine seismic spread of claim 14, wherein the seismic survey objects include one of a plurality of inertial positioning devices and a plurality of steering devices in which the inertial positioning devices are housed.

18. (Original) The marine seismic spread of claim 14, wherein the plurality of acoustic receivers comprise a plurality of hydrophones or geophones.

19. (Original) The marine seismic spread of claim 14, wherein the inertial measurement unit is housed in an inertial positioning device.

20. (Original) The marine seismic spread of claim 18, in which the inertial positioning device further comprises:

a power system for the inertial measurement units;

a communication interface; and

a battery powering the power system and the communication interface.

21. (Original) The marine seismic spread of claim 14, wherein at least one of the inertial measurement units comprises a plurality of accelerometers and gyroscopes.

22. (Original) The marine seismic spread of claim 14, wherein at least one of the inertial measurement units comprises a micro-electromechanical inertial measurement unit.

23. (Original) The marine seismic spread of claim 19, wherein the inertial positioning device further comprises an acoustic node determined by either an acoustic source or receiver.

24. (Original) The marine seismic spread of claim 23, wherein the acoustic source comprises one of an ultra-short baseline acoustic system, a short baseline acoustic system, or a distance measurement acoustic system.

25. (Previously Presented) An apparatus for use in a marine seismic survey, comprising:

a short baseline acoustic system or an ultra short baseline acoustic system, including:

a seismic cable; and

an inertial measurement unit coupled to the seismic cable at a known point and from which the movement of the seismic cable can measured during a seismic survey such that the position of the known point during the marine seismic survey can be determined.

26. (Original) The apparatus of claim 25, wherein the seismic cable comprises one of a streamer and an ocean bottom cable.

27. (Original) The apparatus of claim 25, wherein the seismic cable includes one of a sensor module, a steering device, and an inertial positioning device in which the inertial measurement unit is housed.

28. (Original) The apparatus of claim 25, wherein the seismic cable includes a plurality of acoustic receivers.

29. (Original) The apparatus of claim 28, wherein the plurality of acoustic receivers comprise a plurality of hydrophones or a plurality of geophones.

30. (Original) The apparatus of claim 25, wherein the inertial measurement unit is housed within an inertial positioning device.

31. (Original) The apparatus of claim 30, wherein the inertial positioning device further comprises:

a power system for the inertial measurement units;

a communication interface; and

a battery powering the power system and the communication interface.

32. (Original) The apparatus of claim 25, wherein at least one of the inertial measurement units comprises a plurality of accelerometers and gyroscopes.

33. (Original) The apparatus of claim 25, wherein at least one of the inertial measurement units comprises a micro-electromechanical inertial measurement unit.

34. (Original) The apparatus of claim 30, wherein the inertial positioning device further comprises an acoustic node determined by either an acoustic source or receiver.

35. (Original) The apparatus of claim 34, wherein the acoustic source comprises one of an ultra-short baseline acoustic system, a short baseline acoustic system, or a distance measurement acoustic system.

36. (Previously Presented) A method for use in a marine seismic survey, comprising:

taking inertial measurements of movement of selected points on a seismic spread in a short baseline acoustic system or an ultra short baseline acoustic system relative to at least one known point; and

applying the inertial measurements to the known point to determine the positions of the selected points.

37. (Original) The method of claim 36, wherein taking the inertial measurements includes taking the inertial measurements during at least one of deploying the spread, retrieving the spread and conducting a survey.

38. (Original) The method of claim 36, further comprising supplementing the inertial measurements.

39. (Previously Presented) The method of claim 38, wherein supplementing the inertial measurements comprises at least one of calibrating the positions using a coordinate history determined from acoustic ranging signals and integrating one dimensional measures.

40. (Original) The method of claim 36, further comprising deploying the seismic spread at the known point.

41. (Original) The method of claim 40, wherein deploying the seismic spread at the known point includes one of deploying the seismic spread to the bottom of a body of water and deploying the seismic spread near to the surface of the body of water.

42. (Original) The method of claim 40, wherein deploying the seismic spread at the known point includes deploying the seismic spread in one of saltwater, fresh water, and brackish water.

43. (Original) The method of claim 36, further comprising housing an inertial measurement unit in a seismic survey object.

44. (Original) The method of claim 43, wherein housing the inertial measurement unit in a seismic survey object includes housing the inertial measurement unit in one of a seismic cable, a seismic receiver, a steering device, and a seismic source.

45. (Original) The method of claim 36, wherein taking inertial measurements of the movement of selected points on the seismic spread includes taking inertial measurements of the movement of selected seismic survey objects.

46. (Original) The method of claim 45, wherein taking inertial measurements of the movement of selected seismic survey objects includes taking inertial measurements of the movement of at least one of a seismic cable, a seismic receiver, a steering device, and a seismic source.

47. (Original) The method of claim 36, wherein the seismic cable includes seismic survey objects having known relative orientations with respect to the selected points on the seismic cable, and the method further comprises determining positions of the selected seismic survey objects based on the determined positions of the selected points and the known relative orientations.

48. (Previously Presented) A method for use in a marine seismic survey, comprising:

deploying a short baseline acoustic system or an ultra short baseline acoustic system, including a seismic cable at a known point;

taking inertial measurements of movement of selected points on the seismic cable relative to the known point during the deployment; and

applying the inertial measurements to the known point to determine the positions of the selected points.

49. (Original) The method of claim 48, wherein the seismic cable includes seismic survey objects having known relative orientations with respect to the selected points on the seismic cable, and the method further comprises determining positions of the selected seismic survey objects based on the determined positions of the selected points and the known relative orientations.

50. (Original) The method of claim 48, wherein deploying the seismic cable comprises one of deploying the seismic cable to the bottom of the water and deploying the seismic cable near to the surface of the water.

51. (Original) The method of claim 48, further comprising supplementing the inertial measurements.

52. (Previously Presented) The method of claim 51, wherein supplementing the inertial measurements comprises at least one of calibrating the positions using a coordinate history determined from acoustic ranging signals and integrating one dimensional measures.

53. (Original) The method of claim 51, wherein deploying the seismic cable at the known point includes one of deploying the seismic cable to the bottom of a body of water and deploying the seismic cable near to the surface of the body of water.

54. (Original) The method of claim 51, wherein deploying the seismic cable at the known point includes deploying the seismic cable in one of saltwater, fresh water, and brackish water.

55. (Original) The method of claim 48, further comprising housing an inertial measurement unit in a seismic survey object comprising a portion of the seismic cable.

56. (Original) The method of claim 55, wherein housing the inertial measurement unit in a seismic survey object includes housing the inertial measurement unit in one of a seismic receiver, a steering device, and a seismic source.

57. (Original) The method of claim 48, wherein taking inertial measurements of the movement of selected points on the seismic cable includes taking inertial measurements of the movement of selected seismic survey objects comprising a portion of the seismic cable.

58. (Original) The method of claim 57, wherein taking inertial measurements of the movement of selected seismic survey objects includes taking inertial measurements of the movement of at least one of a seismic receiver, a steering device, and a seismic source.

59. (Previously Presented) A method for use in a marine seismic survey, comprising:

conducting a survey with a seismic spread including a short baseline acoustic system or an ultra short baseline acoustic system deployed from at least one known point;

taking inertial measurements of movement of selected points on the seismic spread relative to the known point during the conduct of the seismic survey; and

applying the inertial measurements to the known point to determine the positions of the selected points.

60. (Original) The method of claim 59, further comprising supplementing the inertial measurements.

61. (Previously Presented) The method of claim 60, wherein supplementing the inertial measurements comprises at least one of calibrating the positions using a coordinate history determined from acoustic ranging signals and integrating one dimensional measures.

62. (Original) The method of claim 59, further comprising deploying the seismic spread at the known point.

63. (Original) The method of claim 62, wherein deploying the seismic spread at the known point includes one of deploying the seismic spread to the bottom of a body of water and deploying the seismic spread to the surface of the body of water.

64. (Original) The method of claim 62, wherein deploying the seismic spread at the know point includes deploying the seismic spread in one of saltwater, fresh water, and brackish water.

65. (Original) The method of claim 59, further comprising housing an inertial measurement unit in a seismic survey object.

66. (Original) The method of claim 65, wherein housing the inertial measurement unit in a seismic survey object includes housing the inertial measurement unit in one of a seismic cable, a seismic receiver, a steering device, and a seismic source.

67. (Original) The method of claim 59, wherein taking inertial measurements of the movement of selected points on the seismic spread includes taking inertial measurements of the movement of selected seismic survey objects.

68. (Original) The method of claim 67, wherein taking inertial measurements of the movement of selected seismic survey objects includes taking inertial measurements of the

movement of at least one of a seismic cable, a seismic receiver, a steering device, and a seismic source.

69. (Original) The method of claim 59, wherein the seismic cable includes seismic survey objects having known relative orientations with respect to the selected points on the seismic cable, and the method further comprises determining positions of the selected seismic survey objects based on the determined positions of the selected points and the known relative orientations.